5-F-125

PHILIPS

VIKING LABORATORIES INC.

E-607

MANUAL

PASSIVE PROBE PM 9351

ATTENUATION 10x

9499 440 07811

15/1170/1/00/01/02

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I. GENERAL

1.1 INTRODUCTION

PM 9351 is a passive measuring probe with an attenuation of 10 X.
This probe is to be used with oscilloscopes up to 150 MHz, provided that their input resistance is 1 MΩ and their input capacity is between 14 and 21 pF.

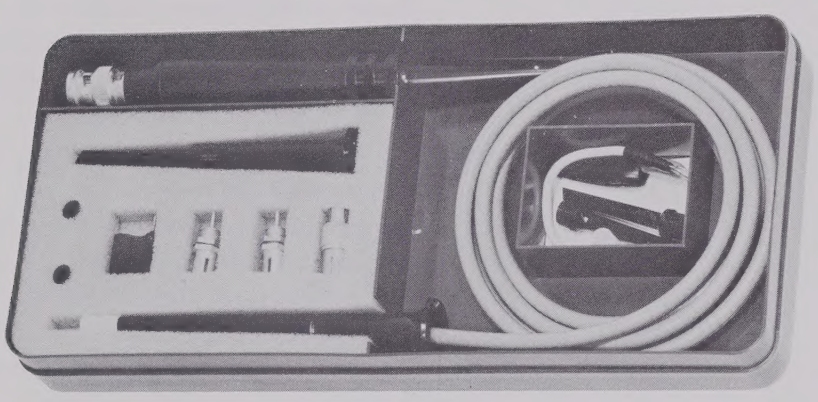

Fig. 1.11 Probe set PM 9351

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1.2 TECHNICAL DATA

A. Attenuation : 10x when connected to a 1 MΩ input.

Tolerance : ± 2 % when connected to a 1 MΩ ± 1 % input.

B. Compensation range : 14 to 21 pF, input capacity of the oscilloscope.

C. L.F. input impedance : 10 MΩ ± 1 % in parallel to 11 pF when connected to an input of 1 MΩ ± 1 %.

H.F. input impedance : see graph (Fig.1.21).

D. Rise time : 1.2 ns

E. Equivalent bandwidth : DC - 290 MHz (-3 dB) probe only.

F. Distortion : < ± 3 % as a result of the probe only (ringing or rolloff).

G. Voltage range : (The probe is connected to an earthed oscilloscope, with an input resistance of 1 MΩ).

I. in the DC.pos. of the oscilloscope:
500 V (DC + AC Peak) up to 1 MHz or 10 times the V max. of the connected oscilloscope.
See graph. (Fig.1.22) for the permissible voltage as a function of the frequency 1 MHz → 300 MHz.

II. In the AC pos. of the oscilloscope:
500 V (DC + AC Peak) up to 1 MHz or the V max. of the connected oscilloscope.
See graph (Fig.1.12) for the permissible voltage as a function of frequency ≥ 7 MHz.

III. The probe is tested for 1500 V.d.c.
Test conditions:
The BNC connector of the probe is terminated with 1 MΩ.
Temperature: + 15° → +25 °C.
Relative humidity: 50 % → 80 %

H. Temperature range : -25 °C → +75 °C within the specification after the adjustment procedure.

I. Cable length : 1.5 meter.

Explanation to Fig.1.21 and 1.22

The input resistance R_p and reactance X_p decrease rapidly with higher frequencies.

The attenuation, i.e. the ratio between the output and input voltage, of the PM 9351, always remains at 1 : 10.

The loading effect on the circuit under test increases considerably with higher frequencies, so that measuring errors may be introduced. These errors can be computed with the aid of the graph in Fig.1.21, which represents the input quantities as a function of frequency.

The maximum permissible input voltage at higher frequencies is reduced due to the inherent decrease in input impedance.
The relation between permissible input voltage and frequency is shown in Fig.1.22.

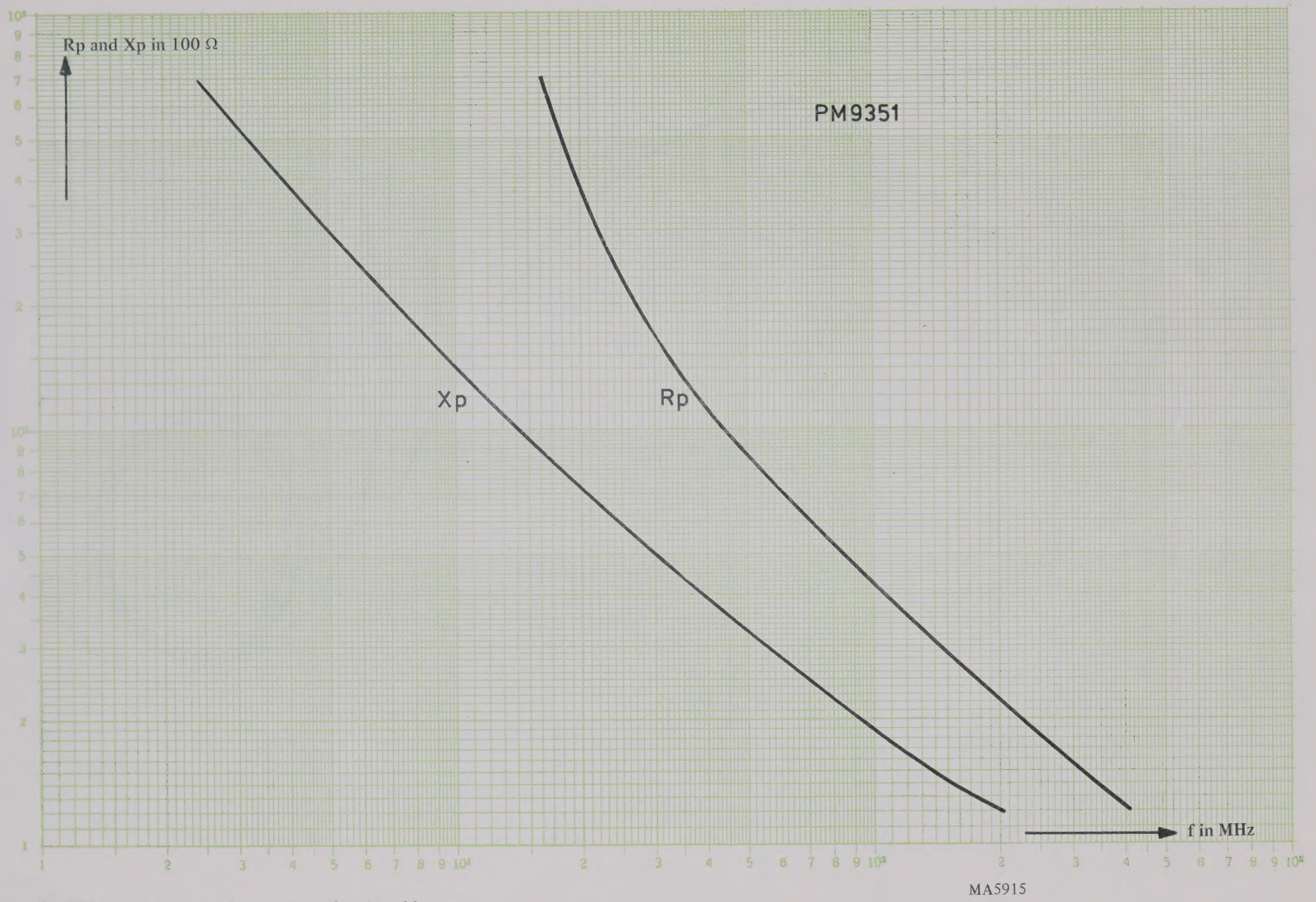

Fig. 1.21 Input resistance and reactance as a function of frequency

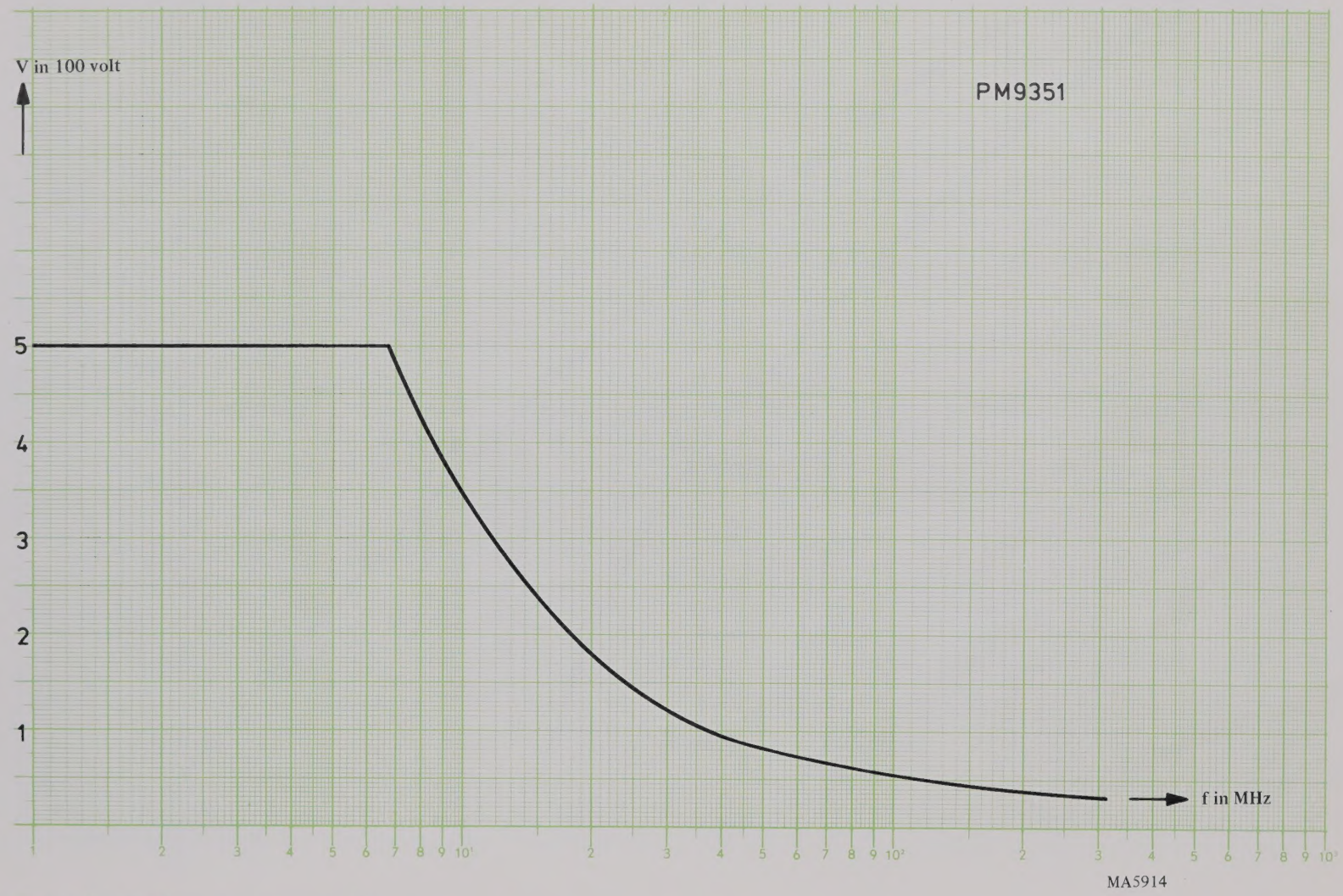

Fig. 1.22 Permissible input voltage as a function of frequency

1.3 ACCESSORIES

Item 1 Probe tip lead and compensation box.

Item 2 Test hook.

The test hook is slid over the probe tip; by pushing the probe tip deeper in the test hook, the hook will protrude, so that the test point can be gripped.

Item 3 Two spare test hook sleeves.

These test hook sleeves are supplied with the probe, to serve as replacements for damaged parts. The test hook sleeve is screwed on to the test hook holder.

Insert the wire hook so that the opening is formed by its tip and the longer side of the sleeve.

Item 4 Earthing attachment.

This attachment facilitates signal and earth connections, if the test point is surrounded by an earthed surface.

The spring loaded earthing pin guarantees a good connection even when the test point and earthing point are on different levels.

Item 5 Two miniconnectors.

These miniconnectors may be incorporated into a circuit as routine-test points.

Earthing the outer shell of the miniconnectors obviates use of the earthing cord (item 9 in Fig.1.31).

Item 6 BNC/measuring pin adaptor plug .

Item 7 Two insulating caps.

In densely wired circuits, an insulating cap may be slid over the metal part of the probe, to prevent contact between the probe housing and surrounding conductors.

The earth connection is made by means of the earthing cord (item 9 in Fig.1.31).

Item 8 Two protective caps.

If the probe is not in use, one of the protective caps should be fitted in order to prevent damage to the probe pin.

Item 9 Earthing cord.

The fork of the earthing cord is pushed into the slot in the middle of the probe body. The crocodile clip is connected to the earthing point of the circuit under test.

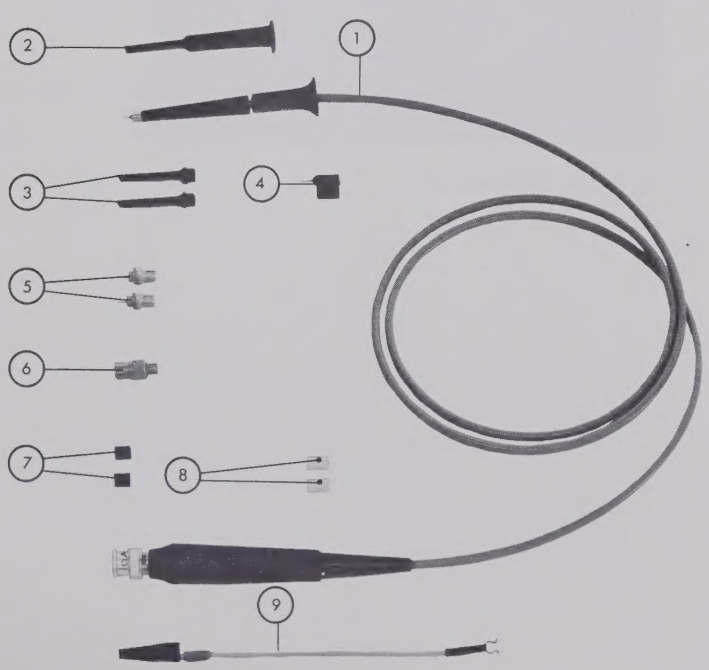

Fig. 1.31 Probe with accessories

II. OPERATION

The measuring probe has been adjusted and checked by the factory.

However, to match the probe to your oscilloscope, the following manipulation is necessary.

Connect the measuring pin to socket CAL of the oscilloscope.

A trimmer C3 can be adjusted through a hole in the compensation box to obtain optimum square-wave response.

See the following examples Fig. 2.11, 2.12, 2.13.

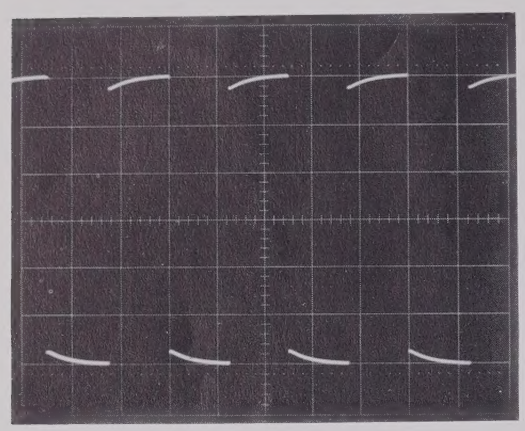

Fig. 2.11 C3 overadjusted

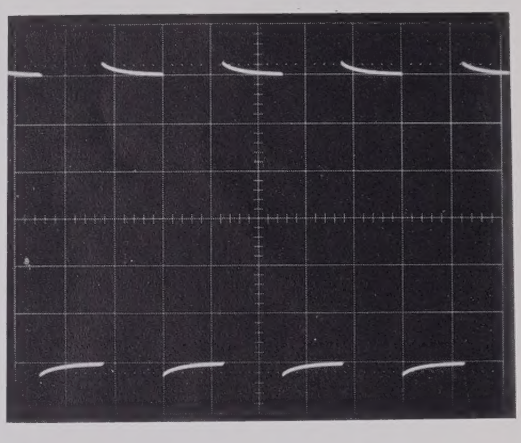

Fig. 2.13 C3 underadjusted

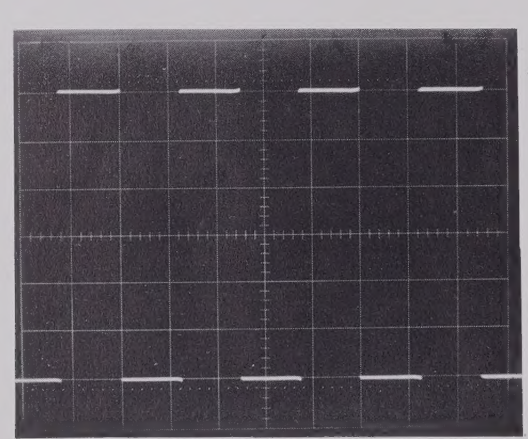

Fig. 2.12 C3 correctly adjusted

III. SERVICE DATA

3.1 DISMANTLING

Dismantling the probe

The forward part (10) of the measuring probe can be screwed from the rear part (13) . (10) and (11) can then be slid from (12) and (13).
The RC combination (12) is soldered to (13).
For replacement of (12) refer to section 3.2.

Dismantling the compensation box

Unscrew the ribbed collar of the compensation box to the cable (19) and slide it back over the cable. The sleeve (17) can then also be slid back over the cable. The electrical components on the printed wiring board are now accessible.

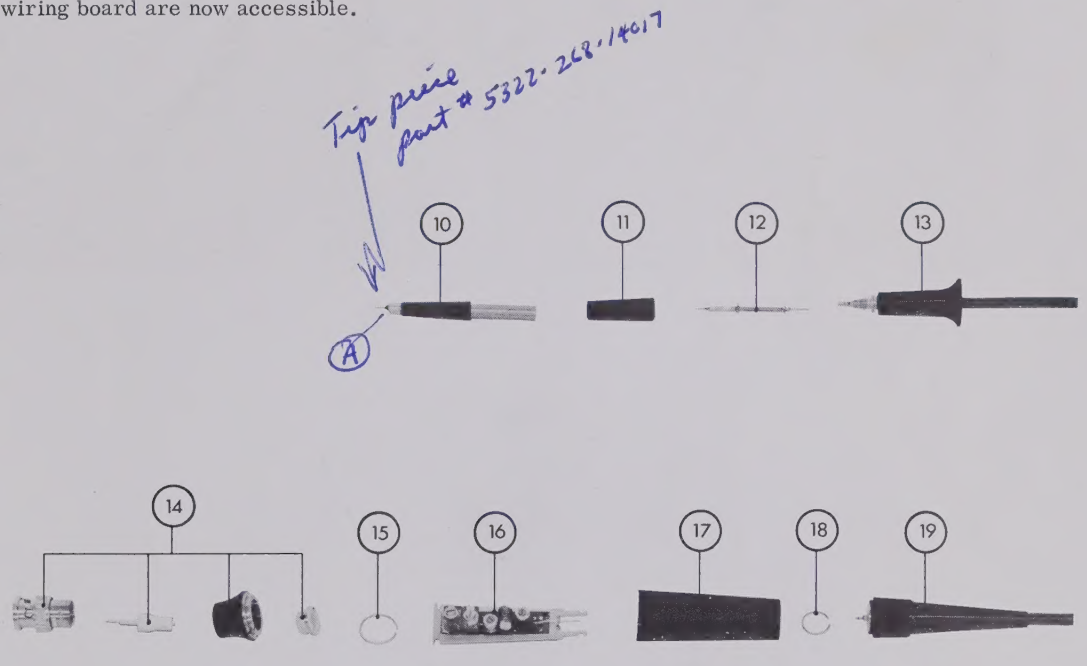

Fig. 3.11 Assembly the probe PM 9351

3.2 REPLACING PARTS

a. Assembling the measuring probe

When assembling the measuring probe, the RC assembly must be at dead centre in the sleeve (Fig. 3.21 at 20).
Ensure that the correct distance between the top of plug (A) and the frontside of the earthing ring (B) is maintained. The distance AB must be 62 mm - 0.5 mm (see Fig. 3.21).

b. Fitting the printed-wiring board

If the compensation box has been dismantled acc. to 3.1., the circlips (15) and (18) are accessible (Fig. 3.11).
Unsolder the connection wires. Rotate the forward circlip until its opening is aligned with the slot of the outer ring.
Slide the BNC connector assembly from the metal bracket of the printed-wiring board.
Rotate the rear circlip until its opening is aligned with one of the two openings in the outer ring.
Swivel the arm of the metal bracket in order to free it from the slot.
Turn the rear circlip a half turn so that the remaining arm of the bracket can be released.

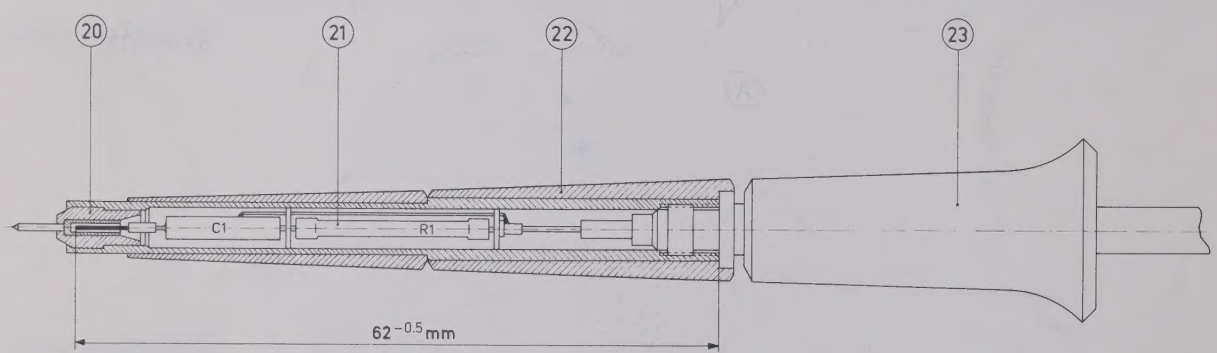

Fig. 3.21 Fitting of the RC-combination

3.3 ADJUSTMENT OF THE H.F. STEP RESPONSE

The following manipulations should only be carried out after replacement or modification of an electrical component of the PM 9351.
Connect the probe to a fast-pulse generator (rise time ≤1 ns) which is terminated by its characteristic impedance. Dismantle the compensation box acc. to 3.1.
Set the generator to 100 KHz. Adjusted C2, R2 and R4 alternatively to obtain a displav as shown in Fig. 3.33. Your oscilloscope must have a rise-time 2.4 n.sec.
It is important that the leading edge is as steep, and the top is as flat as possible.